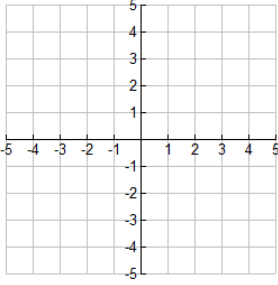
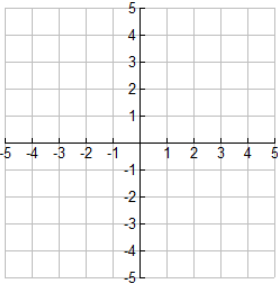
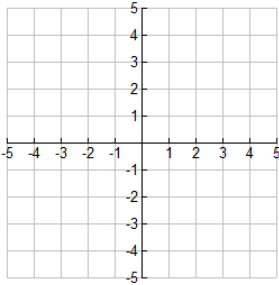
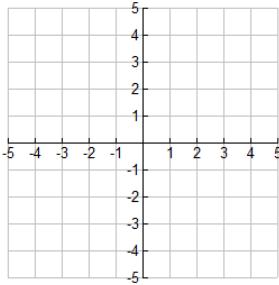
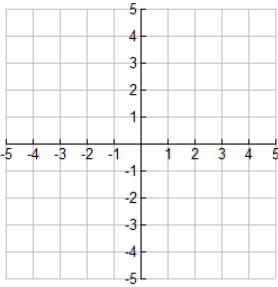
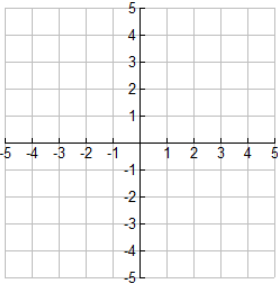
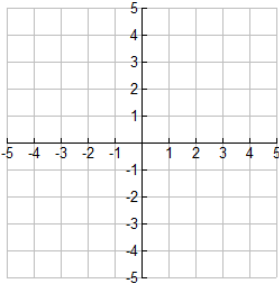
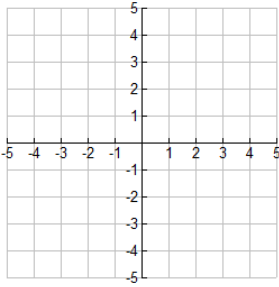


Functions/Regression – Power Functions and Equations

Power Functions and Their Characteristics

– **power function** → a function in the form _____ (k and p are constants) where k is called the constant of proportionality and p is the exponent (p can be any real value, rational/irrational, or positive/negative)

Below are some examples of power functions where $k = 1$ and various values for p:

Power Function # 1	Power Function # 2	Power Function # 3	Power Function # 4
$y = x^0$ 	$y = x^1$ 	$y = x^2$ (or x^4, x^6, \dots) 	$y = x^3$ (or x^5, x^7, \dots) 
Power Function # 5	Power Function # 6	Power Function # 7	Power Function # 8
$y = x^{-1}$ or $y = 1/x$ 	$y = x^{-2}$ or $y = 1/x^2$ 	$y = x^{1/2}$ or $y = \sqrt{x}$ 	$y = x^{1/3}$ or $y = \sqrt[3]{x}$ 

Example 1: Determine which are power functions, circle YES or NO. If YES, state value of k and p.

- a.) $f(x) = 5\sqrt[3]{x^{12}}$ power function? Circle one: YES NO where $k = \underline{\hspace{1cm}}$ and $p = \underline{\hspace{1cm}}$
- b.) $f(x) = 6(x - 1)^2$ power function? Circle one: YES NO where $k = \underline{\hspace{1cm}}$ and $p = \underline{\hspace{1cm}}$
- c.) $f(x) = \sqrt{\frac{36}{x^5}}$ power function? Circle one: YES NO where $k = \underline{\hspace{1cm}}$ and $p = \underline{\hspace{1cm}}$
- d.) $10y + 2 = 5x^4 + 2$ power function? Circle one: YES NO where $k = \underline{\hspace{1cm}}$ and $p = \underline{\hspace{1cm}}$
- e.) $f(x) = -5 \cdot 2^x$ power function? Circle one: YES NO where $k = \underline{\hspace{1cm}}$ and $p = \underline{\hspace{1cm}}$
- f.) $\frac{1}{4}y = (x - 3)(x + 3) + 9$ power function? Circle one: YES NO where $k = \underline{\hspace{1cm}}$ and $p = \underline{\hspace{1cm}}$
- g.) $y + 3 = 3(x + 1)$ power function? Circle one: YES NO where $k = \underline{\hspace{1cm}}$ and $p = \underline{\hspace{1cm}}$

Example 2: Find the equation of a power function with the given information.

Power Function in the form $y = k \cdot x^p$ where the point (x , y) and the point (1 , ?) ($k = ?$) are on the graph		
a.) pts (2 , 12) ; (1 , 4)	b.) pts (7 , 9) ; (1 , 0.5)	c.) pts (4 , 0.375) and (9 , 0.25)

Solving Power Equations – Direct and Inverse Variations

Direct Variation Equation: _____ (where p is a positive #)	Inverse Variation Equation: _____ (where p is a negative #)
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Example 3: Complete each variation problem.

a.) Suppose y is directly proportional to x. If $y = 18$ when $x = 8$, find the constant of proportionality (k). After finding the formula for y, then use it to find x when $y = 27$.	b.) Suppose c is inversely proportional to the square of d. If $c = 4$ when $d = 2$, find the constant of proportionality (k). After finding the formula for c, then use it to find c when $d = -8$.
c.) The radius of a sphere is directly proportional to the cube root of its volume. If a sphere of radius 18.2 cm has a volume of $25,252.4 \text{ cm}^3$, what is the volume of a sphere if the radius is 19.3 cm?	